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THE ZOOLOGIST:

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OF

NATURAL HISTORY

AND

JOURNAL FOR RECORDING FACTS & ANECDOTES

RELATING TO

QUADRUPEDS, BIRDS, REPTILES, FISHES, ANNELIDES,
INSECTS, WORMS, ZOOPHYTES, &c.

THEIR HABITS, FOOD, RETREATS, OCCASIONAL APPEARANCE,
MIGRATIONS, NESTS AND YOUNG.

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ENTOMOLOGY FOR SCHOOLS.

Price 1s. 6d.,

THE INSECT HUNTERS:

BY

EDWARD NEWMAN, F.L.S., F.Z.S.,

LATE PRESIDENT OF THE ENTOMOLOGICAL SOCIETY.

I have written this little book expressly for those who do not pretend to consider themselves experienced naturalists. I do not assume any knowledge on the part of the learner, but begin at the beginning, and attempt to educate the reader up to the point of understanding the more elaborate and learned Introductions to the Science; indeed, I am not altogether without a hope that some will consider this inexpensive and unassuming book a sufficient Introduction to the Science.—*Edward Newman.*

"This is the first book from any author who understands the art of teaching Natural History pleasantly."—*Report of the Northern Entomological Society.*

"In the 'Insect Hunters,' by Mr. Newman, the author has brought together, in a very pleasing way, a great deal of really good entomological matter bearing upon the habits and economy and classification of insects. I can strongly recommend it to young persons who wish to obtain sound entomological information; and the kindly tone in which the work is written is deserving of much commendation."—*Address of W. Wilson Saunders, Esq., to the Entomological Society of London, Anniversary Meeting,* 1858.

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"There is a capital chapter on Metamorphosis, and the families in all the orders have their prominent characteristics concisely yet emphatically set forth. * * * For the young who have not had their attention drawn to Entomology we think this an admirable book, one that a parent might give to his child without any fear that the contents were not strictly true."—*Entomologist's Weekly Intelligencer.*

"The descriptions are accurate, and the author is well acquainted with the subjec on which he writes."—*Athenæum.*

"The conception of this little work is novel, and its execution excellent. It i likely to extend very widely the knowledge of Entomology. * * * We have, i a small compass and in the most captivating and easy form, all the information that i really essential to the study of Entomology."—*Literary Gazette.*

"This is a little unassuming book, addressed by an experienced naturalist to a intelligent child, whom he leads by the hand through lanes, woods and meadows, showing her the living objects of his lessons, and explaining, in language adapted to childhood and youth, the habits and characters of each. We are spared all those unintell gible technical explanations to which children will scarcely ever listen with patienc and which they never remember."—*The Friend.*

"This work forms a complete introduction to the science of Entomology, written i clear and graceful language."—*Kentish and Surrey Mercury.*

London: Newman, 9, Devonshire Street, Bishopsgate.

'Annals of Natural History' for 1840: his idea of its being a parasite, is, however, certainly disproved by this discovery of Mr. Elliot."

Mr. Westwood added that Mr. Shuckard, in his 'Monograph on the Dorylides,' referred to by Mr. Thwaites, had suggested that Typhlopone was composed of females of Labidus, and had consequently removed the former from the family of the ants, considering the Dorylides as an osculant family between the Mutillidæ and Formicidæ, whereas he (Mr. Westwood), in the Arcana Ent. i. 73, had shown Typhlopone to belong to the family of the ants, and had considered the Dorylides as a section of the Formicidæ, doubting, at the same time, the supposed sexual connexion between Typhlopone and Labidus.

Mr. Smith observed that the communication was certainly very interesting: Dr. Savage had, however, to his own satisfaction, settled the relationship of Dorylus some years ago. In the 'Proceedings of Natural Sciences of Philadelphia' for 1850, a communication from Dr. Savage states, that he found in Africa a number of specimens of Dorylus in company with a new species of Anomma, "A. rubella, *Sav.*'; the latter he considers to be the workers of Dorylus, yet, notwithstanding this opinion and the details given, Mr. Smith expressed his doubts of there being any specific connexion between these insects; they were not even found in a nest, but upon the ground, the Dorylus being mixed with a procession of Anomma. Although great disparity in the size of the sexes of some species of ants was well known, no instance of the male so greatly exceeding the worker had come under his notice, and in India Dorylus was common, whilst Anomma has not yet been found. Mr. Smith was far more inclined to adopt the opinion of Dorylus being the male of Typhlopone, but he did not consider the communication decisive upon that point; the Dorylus it appeared had been discovered in the same nest, or in company with workers of Typhlopone, but the female had not been discovered, and Dorylus might yet prove to be a parasite. Mr. Shuckard had suggested the probability of Labidus, the New World representative of Dorylus, being the male of Typhlopone; and as the latter genus, or one very closely resembling it, had been received from Brazil from Mr. Bates, the communication, should the connexion therein stated prove eventually to be correct, certainly confirmed Mr. Shuckard's views.

Mr. Stainton read the following paper:—

On the persistence of Species.

"Some strangely heretical notions were broached at the last Meeting,—at least they were such notions as must appear heretical to all who have closely studied species.

"It was suggested that those individuals of a genus which all who have most carefully investigated the subject agree in considering *species*, were not in reality *species*, but merely varieties, or rather races caused by some modification of habit. The statement that different species will, in the larva state, feed on different plants, was used in an inverted manner to imply that eggs of one species laid on four or five different plants will produce apparently as many different species.

"I do not wish in the slightest degree to overstate the new theory, but I cannot see that it differs in degree from what I have just mentioned. Species somewhat similar feeding on closely allied plants were suggested as probable variations caused by the difference of food; but if a slight difference of food causes a slight apparent

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difference of species, a greater difference of food would of course produce a greater apparent difference of species, and thus each genus might be assumed to consist of only a single species, varying according to its food and other circumstances.

"Hence species *are* not; they *were* merely phantoms of the brain of the naturalist.

"The difference between the two specimens of Cemiostoma I have exhibited is not a specific difference; Scitella, driven by stress of weather far from its usual food, laid eggs on Lotus, and thus produced an apparently new species. It is of course an interesting problem whether, if this insect bred from the Lotus were to deposit eggs on an apple-leaf the result would not be some other aberrant creature, which the first captor would hold to be a new species till an elaborate investigation into its pedigree should show that it was descended from Scitella, out of Lotus, by Scitella, out of apple.

"Such theories would never have been started but for the smallness of the objects under discussion.

"I have also brought for exhibition two hitherto reputed distinct species of butterflies, of the genus Vanessa; but as they are very similar in appearance, and feed on plants of the same natural order, Urticaceæ, perhaps the Meeting will now be disposed to consider Polychloros and Urticæ as one species: it will of course be remarked that the flight of these two insects is very different, that of Polychloros being far the more powerful; but then it must be borne in mind that elm trees grow higher than nettles, and consequently a butterfly bred from an elm tree might be expected to be endowed, on that very account, with stronger organs of flight.

"I could multiply similar instances *ad nauseam;* but really I feel that I am unnecessarily taking up the time of this Meeting, and I should not have recurred to the subject but for the number of young entomologists who now attend our Meetings, on some of whom the idea of gradual developments from one species to another might have most injurious effects, were it not briefly, yet effectually, exploded."

Mr. Westwood considered it would require far greater research than had yet been made, and far more argument than the few lines Mr. Stainton had just read, to disprove the theory he had advanced at the last Meeting, although Mr. Stainton was pleased to imagine he had "effectually exploded" the idea of gradual developments, yet he (Mr. Westwood) still maintained that many of the supposed new species of Micro-Lepidoptera lately established might be merely modifications of other species dependent on diversity of food or other circumstances with which we are not acquainted. That many species of animals, including insects, underwent modifications and became, so to speak, geographical or structural sub-species was well established, as might be seen in Mr. Wollaston's work on "Species," since the publication of which a great change had taken place in the minds, especially of German naturalists, as to the specific rank of many of the supposed species of Carabideous insects, which were now sunk into local sub-species. It was not sufficient to say that larvæ which had fed on the oak, would die rather than feed on any other tree, because the experiment was tried with an individual which had already become quercivorous. Many of the best botanists had also adopted the theory of local sub-species; it was quite necessary to register these permanent or even transitory sub-species, but far more philosophical to endeavour to discover the centre, so to speak, from which they radiated.

Mr. Douglas remarked that in some of the species most closely allied, as, for instance, Cemiostoma Spartifoliella and Laburnella, it was not merely that they fed on different plants, but the habit of the larvæ was totally different, and it would be a preposterous doctrine to maintain that the difference of the habit was the cause of the modification of the species, and not rather that the habit differed because the species were different.

Mr. Dunning said he was no advocate for the notion of species gradually changing from one form to another.

Mr. Stainton observed that Mr. Westwood's remarks went fully the length of maintaining the development theory, and in further illustration of the difference of habits, showing closely allied species to be distinct, he exhibited larvæ of M. Millière's new Coleophora Lugduniella, feeding on Vicia Cracca, and larvæ of C. Vibicella, on Genista tinctoria; the former larva having an ample silken cloak thrown over its black case, and the latter being entirely without the cloak; the former larva eating the leaves through into holes, and the latter blotching the leaves in the usual Coleophoric fashion.

Mr. Vardon called the attention of the Meeting to the lamentable state of the fruit trees in Worcestershire: a few weeks ago they promised one of the finest crops ever seen, which had since been totally destroyed by multitudes of caterpillars, some of which he laid before the Meeting. His own orchards were planted with currant and gooseberry bushes under the fruit trees, and the caterpillars after defoliating the latter, had descended to the former: he would feel much indebted to the members present for any suggestions calculated to remedy or mitigate this serious evil: the crop on at least 1000 acres being totally destroyed.

Mr. Westwood observed, with reference to the statement of Mr. Vardon, as to the wholesale destruction of the apple crop (as well as of that of the currant and gooseberry trees planted under the apples), that the caterpillars which had now proved so destructive for several years were those of the winter moth Cheimatobia brumata, and that as they were now full-grown, the mischief which they had produced had arrived at its height for the present year. The destruction of such of the caterpillars which still remained in the trees by beating the branches over large sheets, and which had already been practised to a large extent, was still highly desirable; but Mr. Westwood considered that the peculiarities of the perfect insect offered much greater facilities for preserving the crop of next year. The habit of the caterpillar to descend to the ground and undergo its transformations in the earth, together with the fact that the female being wingless, would only be enabled to lay her eggs upon the tips of the present year's shoots (so as to allow the newly hatched larvæ to find an immediate supply of food) by creeping up the trunks of the trees, suggested what appeared to be a satisfactory means of combatting this pest. The German horticultuturists had indeed invented a kind of boot or box for the protection of the base of the trunk of the tree, composed of four upright boards fixed close round the tree, each having a small oblique ridge at the top, the inner surface which was kept (during the months of October and November when the perfect insects appear) moistened with gas tar or other sticking matter, which caught the females as they endeavoured to ascend the trees. It would also be very advisable at the same period of the year, either to remove and burn the earth beneath the trees to the depth of several inches, in order to carry away and destroy the chrysalids, or to beat the surface hard so as to prevent the moths making their escape to the open air. Children might also easily be trained to watch for and destroy the females when they make their appearance. They, however, rapidly ascend the trees so that much vigilance is required. It had been asked whether it would not be advisable to destroy the apple trees in order to save the gooseberry and currant trees beneath, but this appeared a proceeding very doubtful of success, as the insects certainly first attacked the apples, and the destruction of the latter would only increase their attacks on the other trees.

Mr. W. W. Saunders read "Descriptions of some new species of the genus Erycina."—*E. S.*

ZOOLOGICAL SOCIETY.

Tuesday, April 27, 1858.—Dr. GRAY, F.R.S., V.P., in the chair.

Mr. Sclater read the second part of a "Synopsis of the American Ant-birds (Formicariidæ," containing the Formicivorinæ or Ant-wrens, the second sub-family according to his arrangement of the group. The members of this section enumerated amounted to sixty-eight in number, divided into ten genera. Among these species were four considered to be undescribed, which were characterised under the names Myrmotherula multostriata, M. cinereigularis, Uromacra nigricans, and Pyriglena maculicaulis.

The Secretary read descriptions of some new Pinnæ, and of a new Oniscia, from the collection of Mr. Cuming, by Mr. Sylvanus Hanley; and descriptions of ten new species of Bulimus from the same collection, by Dr. L. Pfeiffer.

Dr. Gray made some additional observations on the genus Furcella.

He also read a paper "On a new Genus and some new Species of Uropeltidæ in the Collection of the British Museum." The new species were characterised under the following names:—Siloboura Ellioti, S. Ceylonica, Morina Templetonii, M. unimaculata, M. melanogaster, and Maudia Jerdonii.

Dr. Gray likewise read a paper "On Carpentaria, a new form of animal, intermediate between Rhizopods and Porifera, or a sponge with a foraminated many-celled shelly case."

Dr. Gray read a note on the egg of the "mooruk" (*Casuarius Bennettii*), which was exhibited to the meeting by Mr. S. Stevens.

Tuesday, May 11, 1858.—JOHN GOULD, Esq., V.P., in the chair.

Mr. Gould exhibited to the meeting a specimen of the American species, Regulus calendulus, which was shot in a wood on Loch Lomondside, by Dr. Dewar, about five years since.

He also exhibited a specimen of the night heron, which had been shot at Coombe Abbey, the seat of the Earl of Craven.

Mr. Gould stated that he had received a letter from Dr. Bennett, of Sydney, stating that since he had written the account of the new cassowary, which Mr. Gould at a recent meeting of the Society named Casuarius Bennettii, a young bird of the same species had been brought to Sydney; that he had successfully negociated the purchase of the original adult bird, which had been placed on board the ship 'British Merchant,' in charge of Dr. Plomley, who was returning to England; and that the ship sailed on the 2nd of March, with the bird alive and in good condition. Mr. Gould therefore trusted that this rare and valuable bird would, under the care and attention of Dr. Plomley, arrive alive in the gardens. It is intended as a present to the Society from Dr. Bennett. A drawing of the young bird was exhibited to the meeting.

The Secretary read an extract from a letter dated Eastbourne, May 3, 1858, addressed to Mr. Gould, from his son, Mr. Charles Gould; it ran as follows:—"In the course of my walk yesterday I came close to a sand pit rather suddenly: a number of rabbits were playing about, which scampered off as soon as they became aware of the dread proximity of man, leaving behind them, however, six or seven nondescript companions about their own size, sedately playful, awkward and grotesque. At the distance at which I first saw them I was quite at a loss to imagine what they were. Finding they were curious rather than shy, I approached nearer, and found them to be young fox-cubs; they allowed me to venture within about fifteen yards of them, and then retired without any indecorous haste, one by one, into their holes."

Mr. Gould made some observations on the Indian Phasianidæ imported last year, and now laying in the gardens of the Society.

Drawings of the eggs of the Impeyan pheasant, the Cheer, the purple pheasant, and two species of Kalegee, were exhibited to the meeting.

Mr. Holdsworth made some remarks on the sea-anemones, and particularly on a specimen of the rare Anthea Couchii, now exhibited for the first time in the aquarium.

Mr. Sclater laid before the meeting the third and concluding portion of his "Synopsis of American Ant-birds (Formicariidæ)," containing the third sub-family, Formicariinæ. Among the forty-six species referred to this division were two from the Upper Amazon, which were considered to be new, and named Myrmelastes plumbeus and M. nigerrimus.

With reference to the eggs of Indian Phasianidæ, Mr. Sclater remarked that, though the eggs of the Gallophasis albo-cristata and G. melanota were easily recognisable, as of distinct species, as indeed were the birds themselves, yet it was well known in India that, in the region where these two species inosculate, a transitional variety is found, passing from one to the other. This was not so surprising in a gallinaceous bird, but the same thing occurred in two instances in birds of the Passerine groups, and was very remarkable. No one would deny the specific distinctness of Coracias bengalensis of the Indian peninsula from C. affinis of Assam, or of Colaptes aurata of the eastern United States of America from C. mexicanus of California and Mexico; yet, in the country where these species respectively inosculate, intermediate varieties are found.

Mr. Sclater also read the statement of the person who reared the Magellanic geese now in the gardens, from which it appeared that they were all three hatched from eggs taken from one nest in the Falkland Islands; and all doubts as to the very dissimilar male and female being of one species were thus removed.—*D. W. M.*

Proceedings of Natural-History Collectors in Foreign Countries.

MR. LOUIS FRASER'S EXPEDITION TO ECUADOR AND PERU.

Mr. Fraser's letters, containing the account of his journey from Cuença to Gualaquiza, have miscarried. The following are extracts from subsequent letters:—

"Gualaquiza, February 13, 1858.

"I have been to Zamora for a fortnight,—you will find it marked in the map. I got a few additional things, but no novelties. The insects stung my feet to such a fearful extent that they produced twenty-four sores, and I was compelled to return here, since when I have been trying to cure them and am still confined to the house. All the whites here (four in number) are suffering more or less from these entomological sores. It has rained more or less every day since I left Guayaquil, although they call it the dry season, and I have great difficulty in keeping what I have collected. As for drying them, that is quite out of the question, and after skinning and preserving my small quadrupeds, I have been obliged to put them into spirits to save them.

"I have altogether about 200 skins, some breast-bones and a skeleton of Daptrius, skulls of tapir and white-lipped peccary, some six canisters of things in spirits, some Lepidoptera, a very few shells, two orchids and a bulb, which I will try to dry in some oven in Cuença. I hope and trust that my collection, which I left in Cuença, has not suffered.

"On the road to this place I saw beautiful specimens of the Peruvian cock-of-the-rock (*Russicola Peruviana*): it is called by the Ecuadorians 'Gallo de montana.' Why it should be called 'cock of the rock' I know not, as it frequents the forests of the mountains: its cry is like the creaking of a signboard before a country inn, moved by the wind, and is compared here to that of a young monkey.

"Crossing the river Rosario, on the 14th of December, was an awful job: the river rising very rapidly, we had to walk on two very slender limbs of trees, which sprang considerably, the balustrades consisting of ropes held by boys on either side, forming anything but a pleasant or safe mode of transit: although it is only about six feet above the water, should a person fall in there would be but a very slight chance of his escaping alive. It is a mountain torrent, and the fragile bridge is laid over between four falls, of some six feet each: it is about fifteen yards wide. Our beasts were passed by tying a hide-rope round their necks, and the boys on the opposite side hauling them across: their attempts to swim were quite useless; the torrent rolled them over and over like a cask, and they were dragged ashore almost exhausted.

"These are the best native houses I have seen anywhere; the rooms are up a ladder; the walls are composed of bamboo sticks, set about an inch apart, to let air through; the flooring is made of the outsides of bamboo flattened: the roofs are very neat and nicely rounded at the ends, and thatched with leaves; the principal fault with these houses being their springing and shaking when any one moves about.

"The Shu-iberos paint themselves with red or black, or both, in various ways, apparently according to fancy: sometimes it is done like stencilling, patterns being made and laid on the cheeks or other parts, and the colours rubbed through the openings; the chest, back, arms and legs are sometimes also covered with paint. The women are very small in size, and by no means smart in their dress, well built or good looking. A dark cotton cloth, of native manufacture, round the loins, nearly reaching to the knee, is their only garment: they dye their hair and teeth with the same black as they paint their skins with: their hair is long, tied into tails and ornamented with beetles' wings and skins of gay-coloured birds at the end, such as tanagers, blue creepers, aracaris and portions of toucans: sticks about six or eight inches long are stuck through the lobes of their ears; lately they have introduced steel penholders for this purpose: beads and seeds are used in abundance round the neck and over the breast and shoulders, and a thick hair belt is tied round the waist. Some few have a kind of scarf attached to the back of the head and hanging down to the small of the back, made of bones, two inches and a half long, quite white and said to belong to monkeys.

"The fireflies are above an inch long and very brilliant: they are called in spanish 'Cucúllu.' There is a frog with a very hoarse voice which seems to say in his gruff tones 'Pretty fire fly fly.'

I note the following, for fear it should be forgotten, and it is as well Mr. Tomes should know it: amongst my Gualaquiza specimens will be found one bat much larger than the rest: the Indian who brought it said it attacks the mules and is called in their language 'Jihimchama.'

The Indians do not live in villages, but scattered all over the country, a mile or more apart: their houses or sheds (for there are no second stories) are about 100 feet long, 30 feet broad, and built in every respect like the one before described, but fitted all round with sloping bamboo benches or bedsteads; at the foot of each of these is a pole, raised about two feet from the ground, upon which they rest their feet, underneath which a fire is kept going. Innumerable dogs are kept tied up, generally upon these bedsteads, but always at the women's end of the building.

"Cuença, March 21, 1858.

"Here I am once more safe and sound, having returned from Gualaquiza without accident. Having bandaged up my sore feet I started, on the 1st of March, and arrived here after dark on the 5th, well nigh tired out, but my wounds, strange to say, improved, owing, I think, to the colder climate. I now propose working towards Quito, in the first place to see our minister, Mr. Cope, and, secondly, to be in a good position to drop down on Esmeraldas as soon as the dry season commences.

"Louis Fraser."

Excursion to St. Paulo, Upper Amazons. By H. W. Bates, Esq.

On the 5th of September last I again embarked on our neat little Upper Amazon steamer, the "Tabatinga," for an excursion to St. Paulo, a village higher up than any I had yet visited, being about 260 miles distant, in a straight line from Ega, but at least 400 miles following the bends of the river. I have little to relate concerning the passage thither, for voyages on the Amazons are very monotonous in their incidents; but as the river in September is at its lowest point, and therefore large tracts of sandy shore exposed to view, there was rather more amusement on the road than on my former excursions in seasons of higher water.

Almost every step of the way we passed monstrous alligators, which, especially in the little bays along the margins of the great sand banks, were congregated in great multitudes, lazily floating, and heedless of the passing steamer. Mr. Hauxwell, the well-known bird-collector, was one of the passengers, and, in the spirit of a true sportsman, could not resist having a shot at them with his rifle. There is only one narrow space in the head of the alligator where it is vulnerable, but Mr. Hauxwell managed to hit a good many. One of these, the commandanto resolved to haul on board for the purpose of extracting a part of the animal, which is in great repute among

Brazilians as a "remedio:" for this purpose he stopped the steamer and sent a boat; the men in the boat had some difficulty in towing the beast, and it took eight or ten strong men to get it on deck. It had still some remains of life, and caused great commotion on board when it lashed its heavy tail and opened its ponderous red jaws; a blow with a hatchet on the crown easily composed him at last. The length was fifteen feet, but this dimension cannot give a correct idea of the immense bulk of the animal, as the head and trunk are much larger in proportion than they are in the smaller animals of the lizard tribes generally.

Besides alligators, we were much amused in watching the turtles; these were especially numerous in the broad still bays near the sand-banks, as it was now near the time of their congregating to deposit their ova *en masse* on those places. Numbers of them would be seen ahead; their droll-looking snouts and the convex part of their shells, visible above the surface: they would remain looking at the steamer until it had nearly passed, and then apparently at last losing confidence, dived like ducks under the water. Herons, too, were in vast numbers on some of the sand-banks, especially the large snowy white species; sometimes a flock of them would keep flying ahead a short distance before the steamer for several hours together.

We reached St. Paulo on the 10th, and on the 11th I began my labours in the vicinity; continuing them, with the intermission only of a few days caused by an attack of fever, for five months, re-embarking for Ega on the 2nd of February. The village was originally formed by the Indigenes of the nation Tucúna; and indeed is still peopled mainly by them, for there are not more than a dozen white or rather mestizo traders established here, who, instead of civilizing the Tucanas, have adopted their mode of life. The Indians themselves still exist in small numbers, in their original state, in the forest about two leagues from the village, and there are many more on the different small rivers within a distance of fifty or sixty miles from St. Paulo. They are a particularly gentle and peaceable race of people; I often met them when alone and unarmed in the forest, and was always met with smiles and sometimes presents of fruit. They are a branch, doubtless, of the same race as the Juris, Mundurucús of the Tapajos and Jurúnas of the Xingu: they tattoo their faces like those nations, but generally in a different style; not in a large black patch as the Juris, nor in a cross-barred cancellated pattern, like I have seen generally amongst the Mundurucús, but in curves and scrolls on the cheeks and at the corners of the mouth. These poor people have adopted too completely almost the only thing the low white traders at the village have had to teach them, *i. e.*, the habit of drunkenness. Life in St. Paulo is an almost perpetual orgy. I never saw anything so disgusting in the course of my travels: if it were not for this, the village would be a very good station for a naturalist. There are means for making excursions by water beyond the Peruvian frontier, as well as up some of the neighbouring rivers. The vicinity of the village itself also offers many advantages; there are good paths leading away many miles through the forest: the surface of the country is much broken up and varied; the village itself is situated on a hill, considered a remarkable elevation in this flat country; the summit of which forms a plateau, which extends about a mile into the interior, where it descends to a beautiful valley in the midst of the most luxuriant forest. On one side of the village the plateau ends abruptly, descending a springy and boggy meadow, and thence through the forest deep down into a cool shady dell, at the bottom of which flows a brook of icy-cold water. Brooks, large and small, traverse the forest in almost every direction, and one is constantly meeting with springs and bubbling sources. Some of the rivulets flow over a sandy and pebbly bed, whose banks are clothed with the most exuberant and beautiful vegetation. Indians have built their slight palm-thatched huts on their borders, without clearing, however, any extent of the forest, so you have everywhere agreeable shade and coolness. I think I have never seen such lovely spots as some parts of the banks of these rivulets; cheered even amid the heats of midday by the songs of many strange birds. There is one bird, especially, which I have heard only once or twice at Ega — here very common; the people call it the "realejo" or the hand organ,—I find its notes exactly like those of the flageolet; but its music is not so perfect as that of our European songsters, because the strain is too short, consisting of only a few tender notes like the commencement of an air, and then stopping suddenly, or interrupted by a clicking noise like a hand-organ out of wind: I could not get a sight of this bird, although its voice seems to come from the trees close by.

I applied myself during my stay here chiefly to Entomology: I was not successful in obtaining hunters to assist me in forming a collection of the birds of the locality, and there is little or nothing to be found in other departments. I was very glad to discover, in the course of the first few days, that a great number of the most conspicuous diurnal Lepidoptera were quite different from anything I had yet seen. I found a locality just within the borders of the forest, a roosting-place of vultures very attractive to them; here nearly all the fine Nymphalidæ of the locality and many of the handsomest Erycinidæ and Hesperidæ, were accustomed to congregate. Sometimes, on hot sunny mornings, they were in such numbers that the place seemed alive with them. Of Catagrammas, there were six species, the rarest and most beautiful of which was a grand new species I discovered at Tunantins last year, and which is described and figured by Mr. Hewitson as C. excelsior: I saw only three of them during the whole of my stay and captured them all. All the Catagrammæ are very similar in habits, delighting to hover about muddy places, but are very wary, sailing away at one's approach up to inaccessible heights on the surrounding trees, sometimes settling on the foliage, sometimes on the tree-trunks. Besides excelsior there is another large species, scarlet and black, very common, especially in the streets of the village; next to this, C. Eunomia, *Hewitson*, was most abundant; of these two I captured the females within the shades of the forest where I never saw a single male: the other three were C. cynosura, *var.* pyga and Clymena. Of Epicalia, in the locality named, I observed seven species, viz., the three well-known orange-banded species, Salacia, Capenas, *Hewitson*, Ancea, and a probably new species allied to this last, having a belt of blue across all the wings: it was much rarer than the Ancea and excessively difficult to capture. Of the grand genus Pandora I took two species. P. Prola, a species found, as I have understood, in the hot valleys on the eastern slopes of the Andes in New Granada, I was glad to find for the first time; St. Paulo appears to be its lowest limit on the Amazon downwards. Its habits struck me as partly those of Ageronia and partly of Prepona, and I have not much doubt the three genera are really related nearly to one another. Pandora Rola was quite a common insect down to the end of October, flying boldly about the streets, constantly entering the open windows of the houses, settling on the white-washed walls; but it was more easily to be captured at the roosting-place of the vultures: there also in January I captured a specimen of another larger species, somewhat resembling the P. Procilla of Hewitson. Of Ageronia there were, besides four common species, two new ones, one quite abundant, the other very rare. Preponæ, allied to our Apatura Iris at home, and like it, attracted by all kinds of ordure, were daily to be seen in the same locality. Amongst a number of the common species, I captured two species new to me, both having much sharper wings and brilliant blue ocelli to the under surface of the posterior pair. In the same place were about a dozen or fourteen species of Eubagis, six or seven of which are new to me; one is of a pale silky blue above, another which I took, however, in the heart of the forest in a sunny opening, is velvety black, with a patch of metallic-green at the base of the fore wings. These two species will contribute to vary more the forms in this most lovely and numerous genus of Nymphalide butterflies. The Eubages I consider come somewhat near our European Fritillaries and Vanessæ, and their larvæ, when discovered, I venture to prophecy, will be multispinose. Paphia and Siderone, two allied genera, were also well represented here; of the former, six or seven species were daily in great abundance, and amongst them four species new to me, one of them almost as brilliantly coloured as the Catagrammæ. Of Siderone, I obtained one of a most handsome new species, in shape of wings like the S. Syntyche, and in colours differing chiefly from that species in wanting the blue. Another genus of Nymphalidæ, very numerous here, was Cybdelis; they were abundant both in species and in individuals in the streets, on the borders of the river and within the margins of the forest, sometimes in vast multitudes consisting of two or three species; the rarer species, however, generally found solitary and apart. I think I found all the Ega species except Celina; but there occurred four species not found so low down as Ega, two of them extend only as far down as Tunantins and Fonte Boa, the other two I found for the first time at St. Paulo, neither of them has any close affinity with the other species of the genus known to me: one of them is perhaps the handsomest species of the genus, the colour and marks of the under surface of posterior wing, somewhat approximating Callithea: the other new Cybdelis, also very handsome, was, for a few days in November, excessively abundant at the roosting-place above mentioned. I found also a very interesting new species, closely allied to Cybdelis (?) Pharsalia of Hewitson; it is however constantly and clearly distinct; it was almost abundant in December for several weeks, at least on the gleamy hot mornings I used to see three or four of them together settling on the moist sandy margins of the brook in the deep dells of the forest in sunny openings. I also captured a female which resembles the same sex in the Cybdeles generally, being brown, with white spots towards the tip of the wings. Heterochroæ, although abundant as everywhere else, yielded me no fresh species, and Pyrrhogyra only one. Timetes were more numerous in species: it is a genus which prefers the moist sandy margins of water, in this respect differing from other genera of Nymphalidæ, especially the typical forms which give the preference to mud and ordure. Berania, at Ega so abundant, here was very rarely seen, whilst Tutelina, which I never saw but once at Ega, is here quite a common species.

In the shady ravines of the forest many species of Ithomiæ were found in greater or less abundance. After having observed last year at Fonte Boa so much that was interesting and suggestive in the geographical distribution and mutual relations of the species, I was curious to observe what further was to be learned at this new locality, I found, as I had expected, an almost total change in the species. I found here nineteen species of the genus, eight of which I had never met with before: on the other hand, eight species found abundantly at Fonte Boa, do not reach this place. I. Illinissa, Ælia and the three allied species, forming a group having nearly the same colours, would appear then to find their metropolis at Fonte Boa, and are doubtless dispersed over the tract of level humid forests between the Jutahi and Teffé, southward of the Amazon and stretching towards Bolivia. The commonest species at St. Paulo was the I. Cidonia (*Hewits.*) and another really near to it, but having a totally different appearance on account of the partially white-coloured nervures; this latter as well as the other six species of St. Paulo Ithomiæ are probably as yet undescribed. Ithomia Cidonia varies very much, but its varieties all gradually blend together, and are by no means distinct like the species allied to I. Illinissa. One species, however, of similar colours to it is quite distinct, having differently coloured shoulder-coverts and collar as well as peculiar neuration and antennæ. Flying amongst the Ithomiæ was now and then to be observed a Leptalis; I was very careful to secure every specimen, and the gathered series, now I come to examine them closely, have interested me as much as any other acquisition made during my excursion. Abstraction made of a white species and the Vocula, the rest may be considered either as six species allied to L. Lysinoë (*Hewits.*), or as the latter branching out into six rather widely differing varieties. In either case they are very interesting, because some of the kinds come to imitate, each a species of Ithomia common only in this locality. It would seem then almost correct to say, that at Ega and other stations these new Leptales are not found, because the Ithomiæ to which they correspond are also absent. L. Lysinoë imitates Ithomia Flora; but three at least of the new species imitate three of the commonest Ithomiæ of St. Paulo; on the wing their resemblance is much more striking than when in the cabinet. In fact I was quite unable to distinguish them on the wing; and always on capturing what I took for an Ithomia, and found when in the net, to be a Leptalis mimicking it, I could scarcely restrain an exclamation of surprise. One species imitates exactly I. Cidonia, another I. Onega, which is more abundant at St. Paulo than at any other place, and a third another unnamed species of Ithomia, also one of the most abundant species. The resemblance between Leptales and Ithomiæ, two groups of Diurnes much more widely separated than they appear in our classifications, is repeated in the case of a group of Bombycide moths, of which there are at least two genera imitating the Ithomiæ and the larger Heliconiæ. One of them, which I saw first at the British Museum, exactly imitates Ithomia Flora; at Ega there is one imitating in the same way Ithomia Fluonia of the same locality. At Fonte Boa appears another standing in the same relation to I. Ælia of the same place, and at St. Paulo there are others occurring simultaneously with the peculiar Ithomiæ of the district. These analogies to me appear one of the most beautiful phenomena in Nature.

I am afraid I am occupying too much space with the details of my doings in the Diurnes. In the genus Papilio I saw little that was new to me: there occured a sharp-winged species apparently the same as, or nearly allied to, a species only found near Parà; the female, however, has spotless fore wings. Crassus was a common species in all other localities, being one of the very rarest. In Pieris I found two new species. The curious P. Lorena was rather common, I took also its female, which is coloured orange and black, almost like a Heliconia. The Glaucopes and Euchromiæ were the only groups of moths at all numerous: in fact, I saw very few species of the other families; but of the above two genera there were many most beautiful species, many, perhaps twelve or fifteen, new to me; and some so common, that they flew up at almost every step from the low herbage. Their habit is to fly quietly, but low, settling on leaves, but remaining on the upper surface only for an instant, hitching over the edge to conceal themselves underneath.

The locality yielded me a good many species of Coleoptera; but generally I consider the district not to be productive in large and handsome species: I attribute this chiefly to the cold clayey nature of the soil. In the Geodephaga I was glad on the first day to observe that the Odontocheilæ, the group of Cicindelæ inhabiting the forest shades of the whole country, were different in species from those of Ega and other stations; I found at once five species new to me, whilst the commonest Ega species were no longer to be met with. On the sandy margins of the brooks in the forest, there were three or four very pretty species of Lachnophorus, also new, and two Ægæ. Besides these, I found only one Lebia, two or three Ozænæ, two Cymindes, some Selenophori and Scarites new to me. The Ozænæ are very interesting insects on account of their supposed relation to the Paussidæ. I have now about a dozen species; the largest of all, about one inch long, I took at St. Paulo, within my own house at night, long after the windows and doors were closed. I think it very likely to be the very rare O. dentipes of Olivier. It flew towards the light, and settled on the wall. On seizing it it crepitated fully as strongly as the large yellow and black Brachini of the country (B. complanatus ?). Two other species I captured flying in the evening on the edge of the high banks of the river. One large species I found at the roots of a tree amongst the earth. I generally find them beneath loose bark of felled trees. With regard to the crepitating faculty, I find it is more generally possessed by the Carabides of the division Truncatipennes than has been hitherto supposed. I have observed it repeatedly and distinctly in species of Cymindis, Agra, Calleida, Cryptobatis, Coptodera, and several other genera.

In the Dytiscidæ I obtained very few things—one Hydaticus, one Copelatus and one Hydroporus—the pools of water were chiefly tenanted by three small species of the curious genus Hydrocanthus, in company with a Laccophilus. The Hydrocanthi merit close attention on account of the peculiar structure of their metasternum, the place of which can scarcely be considered as occupied by the posterior haunches, because it forms an elevated plate of very curious structure, beneath which move the posterior legs. In Staphylini I took several handsome species new to me, one a Scytalinus more than an inch long, flying abroad in the evening. In the same way I captured the largest Pselaphide perhaps as yet known, it is a Metopias. In Lamellicornes the locality proved still poorer than Ega. This is a group which requires a long stay in a locality to meet with the larger species of: I found very few in the scanty flowers which blossomed now and then along the borders of the forest; several, though small, were new and interesting, especially a striped Isonychus and two Macraspes. Within the forest I met with a third species of a small brilliantly metallic genus allied to Chalcentis, and four specimens of a strikingly handsome genuine Rutela, of a most brilliant orange-colour, with two vittæ on prothorax and other marks black. I met with no new Coprophagous Lamellicornes, or Cetoniadæ, and only three new Cyclocephalæ. Buprestidæ and Elaters were not numerous, a few new species occurred—one a Colobogaster, found in cleaving open a piece of fire-wood. Of Chrysobothris I saw scarcely any, although they are found numerously in almost all localities settling in the hot sun on branches of felled trees. Of Longicornes I met with a few only in very fine weather. There were two metallic species of Pyrodes new to me, two pretty little Compsosomæ, a lovely Chrysoprasis with golden coppery femora, and about a dozen of the more minute species flying abroad in warm evenings. To procure these latter as well as many other rare Coleoptera flying in the evening, the edge of the high and steep banks of the river offered great advantages; because in coming up from below they came within reach, and the strong light in the back ground enabled one to discern them. One of the most interesting captures in this family was the Anisocerus Onca (*White*), here changed by a transposition of colours into an insect of quite a different appearance from the type, which is very numerous and invariable at Ega. The black spots have blended with the brown ground-colour, leaving in it several quadrate pale spots arranged somewhat like the black ones in the typical form. All the specimens I found were the same. In the great family Cyclica, I added many new species to my collection. Some groups, such as Coptocycla, are remarkably constant in form, the species being distributed over a very large extent of country in south America; thus, although I met with many curious species new to me, I find they are known Cayenne, or Columbian species, such as C. cruciata, carniolenta, aciculata, vitreata, rubicunda, Cassida trivittata, &c., one or two only I think are new species. In Omaspides, on the contrary, I find the species change from Ega to this place: thus O. basilica is here replaced by an allied, but distinct species, itself not being met with at all. There were also two other species tolerably plentiful on climbing plants in the forest. Another group which multiplies its species in the most prolific manner over districts not far apart is Doryphora: of this I met with many species almost all new to me, but unfortunately only a few specimens of each.

The last family of Coleoptera to which I shall allude is the Erotylidæ. The broader or inflated forms of which, which comprise more than half the family, are peculiar to South America, as are the Ithomiæ and Heliconiæ, and, like the former, offering one or several peculiar species in every locality fifty or a hundred miles apart: they are on this account both most interesting groups. In ornithology the same phenomena are offered very conspicuously in the Trochilidæ and Rhamphastidæ. It appears clear to me the inference, on this account, that such groups are of recent date, geologically speaking, and are most characteristic of the present epoch of the earth's surface. At Ega the most conspicuous species of Erotylus is E. incomparabilis *Perty?* accompanying which are four or five others. At Caiçara, twenty miles above Ega, this species exists as a marked variety; at Tabatinga its place is occupied by a distinct, but similar, form; and at St. Paulo I found it, as well as all its companion species, represented by a set of quite different species. In this group, as well as in all similar groups, the species should be studied with close reference to the localities in which they are found. Hence we see how excellent is the system adopted by the British Museum, which tickets every individual specimen (at least in the Lepidoptera) and comprises specimens of each species from different points of its area of distribution.

In concluding these rambling notes, I must not forget to record also, in illustration of the position, the locality of St. Paulo occupies in the geographical distribution of Amazonian insects; that many common species found generally from Parà upwards, also occur there. Some, such as Papilio Sesostris, Epicalia Numilius, Acontius, and many others do not vary in the least, whilst those which have become very much altered from Parà to Ega, are become still further altered from Ega to St. Paulo: this is particularly the case with Mechanitis Lycidice, and I think others of the same genus. I think a great number of species will be found affected in a similar manner; they can be best studied at the British Museum, where the specimens from the different localities are doubtless to be seen together, as also others from New Granada and the slopes of the Andes.

On the whole, I brought rather more than 5000 specimens of insects from St. Paulo; amongst which there were 686 species new to me of all orders; 79 being new species of Diurnal Lepidoptera.

HENRY WALTER BATES.

The Tzetze, or formidable African Brize Fly.

By the Editor of the 'Indian Sporting Review.'

THE aged naturalist and veterinarian Bracy Clark, who for more than sixty years has made an especial study of the Œstridæ (*i. e.* the "bot-flies" or "gad-flies," as distinguished from the "brize" or "breeze-flies,"—the former of which pass their maggot state within the bodies of quadrupeds, while the latter attack them to suck their blood), has doubtless succeeded in demolishing two alleged new British species of Œstrus, in the 'Zoologist' (Zool. 5542, 5630); but we must respectfully demur altogether to his identification of the terrible African tzetze with the European Œstrus Bovis (Zool. 5720), which can only be accounted for by an African specimen of the latter having been erroneously shown to the veteran entomologist as an example of the destructive tzetze.

That the famous reindeer gad-fly (*Œdemagena Tarandi*) should have lately turned up in Britain might not only have been expected from the recent importations of reindeer into Scotland, to ornament sundry noblemen's demesnes, as remarked by Mr. Clark; but, from an observation of the distinguished entomologist, Westwood, who, in his elaborate paper on the tzetze and its kindred, published in the Zoological Society's 'Proceedings' for November 26th, 1850, remarks that "at the present time some of the reindeer in the gardens of the Society, which were imported last autumn from Lapland, are infected to a remarkable extent with the tumours of this species; there must, I think," he adds, "be from fifty to a hundred tumours on one of these animals." Introduced thus into Britain, it is not improbable that it will infest the deer in parks; for, according to Sir J. Richardson, the reindeer gad-fly attacks the Wapiti stag, but not the moose or bison: and the Wapiti is akin to the European stag or "reindeer," while the fallow deer is at least as nearly affined to the reindeer as are the true stags or Elaphine group of Cervidæ. There are, indeed, two distinct species of "bots" which infest the reindeer, one being the Œdemagena Tarandi, the maggot or larva of which inhabits beneath the skin, like that of Hypoderma Bovis, and also at least two species which infest the Lepus tribe in North America; and the other, or Cephenemyia trompe, the maggots of which are found within the frontal sinuses of the animal, as with Cephalemyia Ovis in those of sheep. This, no doubt, will seem a strange locality, and surprise the many who are unacquainted with the fact; but Bracy Clark remarks of the sheep bot that "I have mostly found them in the horns* and frontal sinuses; though I have remarked that the membranes lining these cavities were hardly at all inflamed, while those of the maxillary sinuses were highly so. From this I am led to suspect that they inhabit the maxillary sinuses, and crawl, on the death of the animal, into these situations in the horns and frontal sinuses;" and he refers to a case recorded in the first volume of the 'Medical Communications,' in which "insects were removed from the antrum maxillare of a woman, and are evidently, as Dr. Latham has supposed, the larvæ of the Œstrus Bovis." How so, this being a subcutaneous larva, infesting the back and sides of horned cattle, and not even horses? Which alone is also an exceedingly strong argument against its being the fearful tzetze of Africa, with which Mr. Clark now alleges its identity!

The French naturalists divide the Œstridæ into "cuticoles," "cavicoles" and "gastricoles;" according as the larva inhabits beneath the skin, the facial cavities, or some part of the alimentary canal of mammiferous animals; and it is not likely that the same kind of bot would be found in two of those situations. But the same species of gadfly infests different sorts of quadrupeds in some instances, as the Œstrus nasalis of Linnæus, which, according to Macquart, is found (*i. e.* in its maggot state) in the gullet not only of the equine animals, but of the stag and goat,—thus both in ruminants and non-ruminants! Again, the Œ. Pecorum finds its way into the intestines of ruminating cattle; and at least four species inhabit different parts of the alimentary canal of the horse. Other gadflies produce bots which subsist beneath the thick hide of the camel, and even of the African rhinoceroses and elephant; and there are "brize flies" also which pierce the hides of those huge quadrupeds (according to Bruce and others), as mosquitos do the human skin; but the Carnivora, so far as known, are exempt from Œstrideous parasites. Then we have African birds (the genus Buphaga) which seem specially ordained to rid the beasts of their subcutaneous maggots, and are otherwise useful to them as sentinels to warn them of the approach of man or other foes; and it is curious that the common Cape "ox-picker" (*B. africana*) has its beak naturally tipped with crimson, looking as if it had been dipped in blood; that of Abyssinia, &c. (B. erythrorhyncha) has the beak wholly crimson.

The Œstrus nasalis before adverted to is designated Œ. veterinus by

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* The interior of the cavity of the bone which supports the horn.

Clark, no doubt a better appellation, as neither does its bot inhabit the nostrils of any animal, nor is it the well-known "nose fly" of our English rustics, which is the Œ. hœmorrhoidalis. Of this latter, White of Selborne remarks that, "About the beginning of July a species of fly obtains, which proves very tormenting to horses, trying still to enter their nostrils and ears, and actually laying their eggs in the latter of these organs, or perhaps in both. When they abound, horses in woodland districts become very impatient at their work, continually tossing their heads, and rubbing their noses at each other, regardless of the driver, so that accidents often ensue. In the heat of the day men are often obliged to desist from ploughing. Saddle-horses are also very troublesome at such seasons. Country people call this insect the 'nose-fly.'" Why it should ever deposit its eggs in the *ear* of the animal seems unaccountable; but Gilbert White was a most accurate observer, as every one knows, and is therefore entitled to all attention: still nothing is more curious than the instincts of the Œstridæ in depositing their ova. As regards the common Œ. Equi, "the inside of the knee is the part on which these flies are most fond of depositing their eggs, and next to this on the side and back part of the shoulder, and less frequently on the extreme ends of the hairs of the mane. But it is a fact worthy of attention," continues Bracy Clark, "that the fly does not place them promiscuously about the body, but constantly on those parts which are most liable to be licked by the tongue; and the ova therefore are always scrupulously placed within its reach," and thus pass on to the stomach: and of Œ. hœmorrhoidalis the same observer remarks, "the part chosen by this insect for this purpose is the lips of the horse, which is very distressing to the animal, from the excessive titillation it occasions, for he immediately after rubs his mouth against the ground, his fore legs, and sometimes against a tree; or, if two are standing together, they often rub themselves against each other. At the sight of this fly the horse appears much agitated, and moves his head backwards and forwards in the air, to baulk its touch and prevent its darting on the lips; but the fly, watching for a favourable opportunity, continues to repeat the operation from time to time, till at length, finding this mode of defence insufficient, the enraged animal endeavours to avoid it by galloping away to a distant part of the field. If it still continues to follow and tease him, his last resource is in the water, where the Œstrus never is observed to follow him. At other times the Œstrus gets between the fore legs of the horse whilst he is grazing, and thus makes its attack on the lower lip: the titillation occasions the horse to stamp violently with his fore foot against the ground, and often strike with his foot as though aiming a blow at the fly. They also sometimes hide themselves in the grass; and, as the horse stoops to graze, they dart on the mouth or lips, and are always observed to poise themselves during a few seconds in the air, while the egg is preparing on the point of the abdomen."

Why this species should cause the horse so much annoyance, and the other not any, in effecting the very same object, is one of the many mysteries in the dispensation of things. The common Dhánma snake (*Coluber mucosus*) and the Cobra Capella both prey habitually on rats, and have the same foes to contend with; and why, therefore, should the one be perfectly innocuous, and the other so frightfully venomous?

But it is time to return to Mr. Clark's mal-identification of the tzetze with the European Hypoderma Bovis. In the 'Zoologist' (Zool. 5720), the veteran naturalist remarks, that "a considerable degree of uncertainty and even misapprehension appears to prevail about the fly that Dr. Livingstone so interestingly describes as annoying the cattle in Africa, and which he designates the tzetze, its African appellation. Although introduced as a new species, I beg to observe that it is a very old one under a new name, the fly so feelingly described by Moses of old as infesting the cattle of Egypt, and by Isaiah as being very troublesome in his day; and after these the heathen writers and poets, especially of Rome, do not fail to notice it. The fly itself, the cause of this trouble, has been exceedingly scarce [in collections]. * * * Now this African tzetze, I am led to believe, is the real patronymic of the French *Estre*, made more pronounceable by introducing more vowels and fewer consonants, and then from it we get the Latin *Œstrus* and the Greek *Oistron*, and so forth, all meaning the same cattle-frighting object noticed by all: and so terrific is the fright that the cattle will run away with their plough even through the opposing hedge rather than submit to their infliction; and yet, what is most curious, they possess no weapon of infliction, but simply a telescopic sort of tube for thrusting the egg down upon the skin, which, hatching there, the tiny grub gnaws its way through the skin and forms its nidus there in a comfortable abscess, leaving its abode when fully grown, and tumbling to the earth, becomes a chrysalis and next a fly, which goes forth to perform this strange round of events; the object of which appears to be to save the poor cow and ox from the effects of idleness and repletion, which, in those sunny regions, they would be so exposed to, if not roused into activity and leeched and blistered in this way. Such are the ways of Providence, meant in kindness no doubt. It is the 'susurrus,' or whistle they make that frightens the cattle [?], and not the infliction. And what is too remarkable to be omitted, we learn, from the very ancient poet Avienus, that these isles, abounding in forests, wild cattle and these flies, were known by the name of Œstrimerides before they obtained from the Romans the name of Britannia."

The etymology may be sound, but with this very important modification, that (as was first distinctly proved by Mr. W. S. MacLeay, in the 14th volume of the Linnæan Society's 'Transactions') the οἶστρος of the Greeks was a "brize-fly" and not a "gad-fly" (or Œstrus of modern nomenclature)! In the infancy of Entomology it was likely that the two groups should be confounded: for it having probably been ascertained that the bots infesting cattle were fly-maggots, eventually becoming flies, nothing could be more natural than to suppose that the flies which were continually seen to torment the beasts were the producers of those maggots; and thus the prevalent error which has been continued even to our times, not merely by such an observer as James Bruce, of Kinnaird, in his well known account of the zimb, but even by the venerable Bracy Clark, who has actually made a particular study of the Œstridæ during a long life.

There is more to say on the subject of etymology. The names *Tzetze* and *Œstrus* with *Tsaltysalya* and *Zimb* of Bruce, as likewise our English name *Brize* or *Breeze*, have obvious reference to the "buzz" or "hum" (words of similar origin) of the insect so denominated. But the Œstridæ of modern Entomology do not produce a sound when on the wing! Whereas many of the blood-sucking flies (*Tabanidæ*, &c.), which are the chief tormentors of our cattle, are remarkable for the loud buzzing which they produce when flying about their victims; analogous to the "hum" of our tiny foes the gnats, *alias* mosquitos.

Bracy Clark fails to discriminate the two groups, when, in his essay of 1797, he remarks, that "The singular scene attending the attack on Œstrus on the herd, has often been the subject of poetical description; but no one has more naturally and elegantly delineated it than the bard of Mantua.

> "Est lucos Silari circa, ilicibusque virentem
> Plurimus Alburnum volitans, *cui Asilo nomen*
> *Romanum est, Œstron Graii vertere vocantes.*
> *Asper, acerba sonans:* quo tota exterrita sylvis
> Diffugient armenta; furit mugitibus æther
> Concussus, sylvæque et sicci ripa Tanagri."

Again, "in investigations of the following nature," remarks MacLeay, "it is not only advantageous, but necessary to begin from some fixed and indisputable position. Now such I take to be the identity of the insects termed in French *Taon;* in Spanish *Tavano;* in Italian *Tabano;* and in Latin *Tabanus.* The Tabani are unfortunately insects too common for their name to have been ever forgotten; and knowing what the country people in France call *Taons,* we know the insects which Pliny anciently termed *Tabani.* By comparing Pliny with Aristotle, we find that he invariably translates the word μύωψ (*cæcutiens*) by the Latin name *Tabanus;* and entomologists know well that this Greek name is extremely appropriate to the modern Tabani or *Taons,* which are so remarkable for their eyes, that a common species of Chrysops has at the present day the trivial epithet cœcutiens" * * * A quotation from Aristotle proves not only that the ὄιστρος was not the modern Œstrus, but moreover that Aristotle could never have seen a modern Œstrus attack cattle; for had he seen it, he would most assuredly have termed it όπισθοκενρος. And yet he must have seen his οἶστρος about cattle; for he states positively not only that the οἶστροῖ pierce the hides of quadrupeds, but that they are armed with a strong tongue, and are blood-suckers. In both of these last respects, it is to be observed, that they differ totally from the modern Œstrus, but perfectly agree (as M. Latreille has well said) with the Linnæan Tabani."

Homer and Æschylus and Ælian are further laid under contribution, in proof of this position: "and in short," continues MacLeay, "whenever the μύωψ is distinguished from the οἶστρος, I take the former to be either a Chrysops, or Hæmatopota,* or some insect near to them, and the latter to be some species of the modern genus Tabanus, probably the T bovinus, or 'dun-fly,' whose power of agitating cattle I have myself had occasion to witness. This last insect certainly appears to be the Asilus and Œstrus of Virgil. That the poet's insect cannot be identical with any modern Œstrus is clear from his describing it to be in great plenty, and to be 'acerba sonans.' Now the Œstrus Bovis is everywhere very rare, and according to Mr. B. Clark, makes no noise. The Œstrus Equi is also silent in flying, as I have repeatedly myself observed. So that neither of these insects can be that which is celebrated by Virgil, whose description of the ability of the ancient οἶστρος to make a particular kind of humming noise is corroborated by the scholiast before mentioned, as well as by Ælian."

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* "One circumstance which is mentioned by Ælian respecting the Myops, namely, that it makes a louder hum than the Œstrus, is perhaps against its identity with the modern genus Hæmatopota."

That Homer's insect was not the modern Œstrus is further ingeniously argued "from what he says of the season in which it makes its appearance [I omit the citation]: for there are few cases, I believe," continues MacLeay, "of the modern Œstri appearing earlier than the middle of July: and this circumstance, by the way, leads also to the conclusion, that the English *breeze* or *brize* is not the modern Œstrus, although it is generally understood so to signify in the following punning lines of Shakespeare:—

> 'Cleopatra,
> The *breeze* upon her, like a cow in June,
> Hoists sail and flies.'

"Now Mouffett, who, both as an entomological observer and as a contemporary of Shakespeare, was likely to know the insect then named *brize*, says expressly that the *breeze*, *clegg*, *clinger*, and *taon*, are all the same insect, his description of which proves it to be no other than Hæmotopota pluvialis; for which the *clegg* remains to this day the well known and appropriate provincial name, a name totally inapplicable to the modern Œstrus.

"* * * It is not, indeed, unlikely that some of the ancients* should, like Valisinieri, have seen the perfect insects of the modern Œstrus flying about cattle, and that they should have witnessed the extraordinary agitation which they produce: but, however this may be, they appear to have always confounded such insects with the more common Tabani; for it is the modern Tabanus, or some genus extremely near to it, that they have always described as the οἶστρος."

Mr. Westwood is the latest scientific writer on the general subject now in hand, with whose lucubrations I happen to be acquainted; and he not only determines both the tzetze and zimb of Bruce to be species of the genus Glossina, of the group of "brize-flies," but has treated the entire subject in his usual masterly style; and I cannot do better than quote him, even at some length, and at the expense of a little repetition.

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* Aristotle was certainly not one of these ancients, for he never could have seen a female of the modern Œstrus, as appears from his stating that no dipterous insect has a sting behind. It seems, however, to have escaped the notice of naturalists that this great philosopher was acquainted with, and has described, the larva of one of the modern family of Œstridæ; and, it is rather singular, precisely that larva which Réaumur describes as infesting the fauces of the stag, but of which the perfect insect remains still unascertained.

"The species of insects," he remarks, "which attack the larger of our domestic quadrupeds [also wild quadrupeds, and even man himself,—mosquitos to wit, among the great number and variety of them,] may be divided into two chief classes; *first*, those which do so in order to obtain a supply of food for their own support; and *second*, those which do so with the object of depositing their eggs in such a position, that the larvæ, when hatched from them, will be certain of finding a proper supply of food derived from some part of the animal, either external or internal."

In other words, the one class is simply predatory, and the other is parasitic (being predatory only during the larva or maggot phase of existence); and it should have been surmised that the tzetze fly, which occasions the sure death of so many cattle in Africa, could not be a bot-producer, as it destroys so large a proportion of the beasts that should furnish a living nidus and support for its progeny. Consequently, again we perceive that Bracy Clark must needs be in error in identifying it with the Œstrus or Hypoderma Bovis.

In loose parlance, both groups might be termed parasitic; but on the principle that the first is so designated, all predacious animals would be parasitic on their victims, the animal kingdom upon the vegetable kingdom (with seeming exceptions only), and the latter upon the mineral kingdom. Perhaps the mildest form of parasitic habit, *proprement dit*, is that of the cuckoo or "cow bunting" depositing its egg in the nest of another bird: and about the mildest form of predatory habit is that of the creature that robs another of its food; as the whiteheaded sea eagle (*Haliaëtus leucocephalus*) of North America, or its counterpart in this country (*H. fulviventer*), making the osprey yield up its captured fish; or the skua gull (*Catarracta*) and also the "frigate-bird" or "man-of-war-bird" (*Fregata*) pursuing ordinary gulls, &c., and forcing them to eject their swallowed prey, which is caught up ere it reaches the water. Certain robbers of the hive may be placed in this category: and the next step is, I believe, peculiar to the human animal, in draining the milk of kine, &c. Next follow the multitudinous and varied host of "blood-suckers,"—including the vampyres (*Desmodus*) of South America—not the large and more or less frugivorous bats (*Phyllostoma*, *Vampyrus*, &c.), which have been erroneously accused of this propensity, but certain species of rather small size, which are especially organised for this particular mode of subsistence, having lancet-like front teeth, no grinders whatever, and the shortest alimentary canal in the class of Mammalia; in obvious reference to aliment so excessively nutritious, being that, indeed, to which all food has first to be converted! The Megaderma Lyra of this country also sucks the blood of smaller bats, and either devours them afterwards (as I have witnessed of one put into a cage along with its victim), or relinquishes the bloodless carcass: and here we arrive at the predatory animal that absolutely destroys its victim; as with the Ichneumon flies, &c., which ultimately do the same, invariably, among the true parasitic series.

According to this view of the matter, however, which seems clear enough, certain vile tiny habitants of the surface, "detested baith by saint and sinner," should belong rather to the predatory class; but the fact is, there is no drawing an absolute line of distinction: the "Scotch-fiddle" mite (*Acarus Scabiei*) is sub-cuticular as distinguished from sub-cutaneous; and other Acari are found inside of the quills of the feathers of living birds; and so the gradations run, till we come to so extraordinary an internal parasite as "the worm in the horse's eye," at which many readers have doubtless gazed in the living quadruped. In other words, thus the Epizoa grade into the Entozoa, untechnically so denominated; and both fall under the ordinarily recognised acceptation of the word parasite,—quite recently, an Entozoon has been discovered in the spinal chord of a sheep! But to return to Mr. Westwood's elaborate essay.

"The insects composing the first of these two classes require for the performance of their dread functions an organization of the parts of the mouth, especially fitting them to pierce the skins and hides of the quadruped upon the blood of which they subsist; and we accordingly find that it is precisely these insects which have the mouth-organs most fully developed in the different families to which they respectively belong. The Stomoxys calcitrans, and especially the different species of Tabanus, are pre-eminent in this respect; and the formidable array of lancets in the mouth of one of the latter insects is not to be met with elsewhere among the whole of the flies composing the order Diptera, to which they belong. The effects of the attacks of these insects upon the horse are perceived by the drops of blood which flow from the orifices caused by their bites, and sometimes these wounds are so numerous that the beasts 'are all in a gore of blood.' A still smaller species, named by Linneus the Culex equinus, also infests the horse in infinite numbers, running under the mane and amongst the hair, and piercing the skin to suck the blood. This insect, though given by Linneus as a Culex, appears from his description to belong to the genus Simulium; to which genus also belongs an insect of fearful note, which attacks the horned cattle in Servia and the Bannat, penetrating the generative organs, nose, ears &c., of these animals, and by its poisonous bite destroying them in a few hours. A species of the same genus of minute Tipulidæ is common in marshy districts in England; and I have often experienced its attacks, which have resulted in the raising of a tumour on the part of the flesh which has been attacked, attended by a considerable amount of local inflammation; and hence we may readily believe the well authenticated effects produced upon the cattle above described. There are various other insects which attack the horse and ox, such as the Hippoboscæ, various species of ticks, Anthomyiæ, &c.; and if these do not, from their smaller size, cause a discharge of blood like the large Tabanidæ, it is certain that the irritation which they produce, not only by their presence upon the skin, but also by the sharpness of their bite, must be very irritating to the quadrupeds which they infest.

"The insects which do not themselves feed upon our cattle, but simply infest them for the purpose of depositing their eggs in some convenient place or other on their bodies, are in no instance that I recollect provided with an increased development of the mouth-organs; on the contrary the Œstridæ are either entirely destitute of a mouth, or have only very small rudiments of some of the ordinary parts of the mouth, so as to be entirely unfitted for biting and wounding cattle. The effects, however, which some of the species produce are as annoying as those caused by the bites of the Tabani. The female fly of the common horse-bot (*Œstrus Equi*), it is true, instils no dread into the horse around which she is intently engaged in flying, depositing her eggs here and there in particular spots where the horse is certain to lick the hairs, by which means the eggs are introduced into the mouth and passed into the stomach. So little indeed is the horse affected by the presence of this insect, that I have often stood close to one round which the Œstrus equi has been flying, until the latter has come within the reach of my hand, when I have caught it without trouble. Another species, Œ. hœmorrhoidalis, however, is much more troublesome. * * * The same kind of effect is also produced in reindeer by the Œstrus Tarandi,* and in oxen by another species, Œ. Bovis, respecting which, however, much difference of opinion has arisen. At certain seasons, the whole terrified herd, with their tails in the air, or turned upon their backs, or stiffly stretched out in the direction of the spine, gallop about the pastures, finding no rest till they also get into the water. This Œstrus is asserted by some writers to make a strong humming noise, and hence it has been supposed that the herd of cattle are alarmed at the noise; but this must surely be an incorrect conjecture, as the Œstri, if they make any hum at all, are far outstripped in this respect by many other insects which instil no dread into oxen. Neither are they alarmed in consequence of being subjected to the same kind of attack upon so sensitive a part as the lips, as is the case with the horses attacked by the Œstrus hœmorrhoidalis. It is, however, asserted by some writers that the dread is produced by the pain inflicted by the Œstrus in depositing her eggs, her ovipositor being represented as constructed like an auger or gimlet, only having several longer points it can wound with more effect. When it is stated, however, that the Œstrus Bovis does not occupy more than a few seconds in depositing each egg, we may fairly doubt whether, with her long, fleshy tubular ovipositor, she has been able to pierce the hide of an ox; or whether, as Mr. Bracy Clark suggests, she only makes use of this long instrument to thrust the egg down to the surface of the skin, which she does not pierce, but only glues its eggs to it; the young larvæ when hatched burrowing into the flesh. If this be the case, the act of oviposition must be unattended with pain, as in the case of the deposition of the eggs of the Œstrus Equi; and we must search for the cause of the alarm of the herd, either in an instinctive knowledge that a certain insect flying round them is the parent of a grub which at a future time will be a torment to them, or in the attacks of some other insect; and I confess that I am inclined to consider that Virgil's beautiful description of the annoyance caused by

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* Linneus notes, in his 'Journal of a Tour in Lapland,' July 19th, "I remarked with astonishment how greatly the reindeer are incommoded in hot weather, insomuch that they cannot stand still a minute, no not a moment, without changing their posture, starting, puffing and blowing continually, and all on account of a little

> 'Myriads of insects fluttering in the gloom,
> (*Œstrus* in Greece, *Asilus* named at Rome),
> Fierce and of cruel hum'——

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fly. Even though amongst a herd of perhaps five hundred rein deer there were not above ten of these flies, every one of the herd trembled and kept pushing its neighbour about. The fly meanwhile was trying every means to get at them; but it no sooner touched any part of their bodies than they made an immediate effort to shake it off. In one respect this season is peculiarly propitious to the insect, as the reindeer's coat is now very thin, most of the hair of last year's growth being fallen off."

has a Tabanus rather than an Œstrus for its origin." (That, surely, was abundantly demonstrated by MacLeay).

"The larva of Œstrus Bovis resides beneath the skin of the back of the ox, causing large tumours, and having the extremity of its body constantly placed at the orifice of the wound, where it was introduced as an egg, or introduced itself as a grub, the openings of its respiratory apparatus being placed at that part of the body.

"These introductory remarks," continues Mr. Westwood, "on the different modes in which insects attack our horses and oxen, and the different effects which they produce, will enable us the better to estimate the effects produced by an insect, or several species of insects, of tropical Africa, upon the horses of travellers who have lately returned from that part of the world, where their enterprising researches have been rewarded by the discovery of the great central lake Tchad [by the northern, and of lake Ngami and its tributaries by the southern route]. Captain Frank Vardon, a gentleman who has travelled far in the interior of Africa, has placed in my hands some fragments of Dipterous insects which attacked his horses, causing the death of one of them. The following is an extract from his note to me in reply to my enquiry as to the mode of its attack:—

"'I had always heard that the fly of South Africa was a large gadfly, the size of a bee or hornet. This is quite erroneous: it is not very much larger than the common house fly, but a longer and more rakish-looking insect, and easily distinguished by the transverse black bars on its body.

"'I fancy it is not met with southward of the tropic of Capricorn. It is usually found on hills, plains being free from it. I have ridden up a hill and found the tzetze increasing at every step, till at last forty or fifty would be on my horse at once. The specimens you saw cost me one of the best in my stud. He was stung by some ten or a dozen of them, and died in twenty days. I myself have been bitten by the tzetze; you would almost fancy it was a flea biting you. Some parts of South Africa are, I should say, rendered inaccessible by the presence of this pest; I mean of course to a man who travels in the usual way, with his oxen and horses.

"'How far the tzetze extends in the interior is of course as yet unknown, but I have certain information as to its being 200 miles north of the "Great Lake" [Ngami] recently discovered by my friends, Messrs. Livingstone, Oswell, and Murray.'"

This formidable insect is minutely described by Mr. Westwood under the name Glossina morsitans; and of a remarkable structural peculiarity of the genus, he adds, that—" moreover the bulbous dilated base of the proboscis must evidently play an important part in the economy of the insect, either by giving additional support to the proboscis when in the act of piercing the skin, or by containing powerful muscles for the action of the enclosed setæ ; or, as suggested to me by Professor Owen, this dilated base may be analogous to the dilated base of the sting of the scorpion, and like it contain a reservoir of some powerfully poisonous liquid." The last conjecture suggests, most probably, the true solution of the mystery. As gnats or mosquitos are believed to instil a " droplet " of fluid which occasions the irritation from their punctures, and the purport of which may be to effect some alteration in the blood, adapting it to the minute suctorial organ of the insect, so, in like manner, the bite of the tzetze is probably envenomed, on which principle only it would seem that the effects produced can be sufficiently accounted for. Mr. Westwood remarks—" The account of the irritating powers of the Glossina given by Captain Vardon is, it is true, not so detailed as could have been desired, but we learn sufficient to arrive at the conclusion that its effects are, to a certain extent, exactly like those of the Tabanidæ; how far the attacks may be attended with tumours, similar to those produced by the Simulium, and whether a tropical climate may not extend the effects of the attack, producing inflammatory action upon animals perhaps never before in those latitudes, are questions which have yet to be answered. One thing, however, appears to me evident, that the tzetze is no other than the zimb of Bruce (an insect respecting whose real family and even existence so many doubts have been expressed), or at least that that insect is a larger species of Glossina, to whose real habits Bruce has added those of a species of Œstrus."— His figure of it was undoubtedly got up from memory ; as his figure of the Abyssinian rhinoceros is a copy of Buffon's figure of the Indian species, with a second horn added! And Mr. Westwood remarks that—" It is evident from the note added by the editor of the 8vo. edition, that the drawing of the insect was not a *bonâ fide* one made on the spot, but was manufactured at home."

Finally, I shall only further cite from Mr. Westwood's paper that— " The accounts given by Mr. R. Gordon Cumming of the destructive powers of the tzetze fully confirm the opinion here advanced, and prove that although 'its *bite* is certain death to oxen and horses,' it causes no dorsal tumours like an Œstrus [modernly so denominated]. 'This hunter's scourge,' he says, 'is similar to a fly in Scotland called *kleg,*[*] but a little smaller; they are very quick and active, and storm a horse like a swarm of bees, alighting on him in hundreds and drinking his blood. The animal thus bitten pines away and dies, at periods varying from a week to three months, according to the extent to which he has been bitten. * * * The next day one of my steeds died of the tzetze. The head and body of the poor animal swelled up in a most distressing manner before he died; his eyes were so swollen that he could not see, and in darkness he neighed for his comrades who stood feeding beside him.' "

The best notice which I have seen of the ravages of the tzetze-fly, I proceed to cite from Mr. Anderson's interesting work entitled 'Lake Ngami' where a figure is given of the insect, magnified to about double its natural size.

"During my hunting excursions along the Teoge," observes this traveller, "I encountered, for the first time, that most extraordinary of insects the tzetze. Among the several scourges to which the traveller is subjected in the South African wilderness, one of the greatest is this insect; not, it is true, as to the wayfarer's own person, for he himself escapes almost unscathed, but as regards the horses and cattle.

"The tzetze is found chiefly in the bush, or amongst the reeds, but rarely in the open country. It is confined to particular spots, and is never known to shift its haunts. Thus, cattle may be seen grazing securely on one side of a river, whilst the opposite bank swarms with the insect. Should the natives, who are well acquainted with localities frequented by the fly, have occasion to exchange their cattle-posts, and are obliged to pass through tracts of country where it exists, they choose, I am told, a moonlight winter's night; as during the hours of rest in the cold season, it does not bite.

"In size the tzetze is somewhat less than the common blue-fly that settles on meat, but its wings are longer. Yet, though so small and insignificant in appearance, its bite carries with it a poison equal to that of the most deadly reptile. Many is the traveller who, from his draught-oxen having been destroyed by this pestiferous insect, has not only had the object of his journey completely marred, but his personal safety endangered by the loss of his means of conveyance.

"Very lately, indeed, a party of Griquas, about twenty in number, who were out elephant hunting to the north-west of the Ngami, and who were provided with three waggons and a large number of trek, or draught oxen, lost, prior to their return to the lake, all their cattle by the bite of the tzetze. Some horses brought with them to further their sport shared a similar fate.

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[*] More properly "clegg"; a name for the Hæmatopota pluvialis. [The clegg is probably a very different insect, Chrysops cæcutiens—Ed. Zool.]

"The very same year that this disaster happened to the Griquas, a party of Englishmen, amongst whom was my friend Frederic Green, attempted to reach Libébé; but they had only proceeded seven or eight days journey to the north of the Ngami, when both horses and cattle were bitten by the fly in question, and the party were in consequence compelled to make a hasty retreat. One of the number, I was told, was thus deprived of as many as thirty-six horses, excellent hunters, and all sustained heavy losses in cattle.

"There are large tribes which cannot keep either cattle or horses because the tzetze abounds in their country. But it is only fatal to domestic animals, as wild animals feed undisturbed in parts infested by the insect. Yet many of them, such as oxen and buffaloes, horses and zebras, dogs and jackals, &c., possess somewhat of the same nature.* Moreover it bites man and no danger follows. The sensation experienced has not inaptly been likened to the sting of a flea. When allowed to settle on the hand of man, all it is observed to do is to insert its proboscis a little further than seems necessary to draw blood. It then partially withdraws the dart, which assumes a crimson hue. The mandibles now appear to be agitated; the shrunken body swells; and, in a few seconds, the insect becomes quite full, and quietly abandons its prey. The problem to be solved is, what quality exists in domestication which renders domestic animals obnoxious to this poison. Is man not as much a domestic animal as a dog? Is it the tzetze at all which kills the animal?

"Captain Vardon, of the Indian Army, one of the earlier pioneers of the more interior parts of Southern Africa, was amongst the first to decide the point; for he rode his horse up a hill infested by tzetze, and in twenty days his doubts were removed by the death of his steed.

"According to the statement of the celebrated explorers, Messrs. Oswell and Livingstone, who were severe sufferers by the tzetze, the following symptons are observed in the ox when bitten:—the eye runs, the glands under the throat swell, the coat loses its gloss, there is a peculiar flaccidity of the muscles generally, and emaciation commences, which proceeds unchecked until—perhaps months after the bite—purging supervenes, and the animal perishes of exhaustion. Some die soon after the bite is inflicted, especially if they are in good condition, or should rain fall; but, in general, the process of emaciation goes on for many weeks. In some cases, the animals become blind before they die, as in that of the horse mentioned by Gordon Cumming.

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* According to Dr. Livingstone, the tzetze "appears not to attack asses."—'Proceedings of the Entomological Society' for May 4th, 1857.

"'From what I have seen of the tzetze,' writes Mr. Oswell to me, 'I believe that three or four flies are sufficient to kill a full-grown ox. We examined about twenty of ours that were bitten and died, and the appearances were similar in all. On raising the skin, we perceived a glairy appearance of the muscles and flesh, which were much wasted. The stomach and intestines were healthy; heart, lungs, and liver, sometimes all, but invariably one or the other, much diseased. The heart in particular attracted our attention. It was no longer a firm and muscular organ, but collapsed readily on compression, and had the appearance of flesh that had been steeped in water. The blood of the whole carcass was greatly diminished in quantity. Not more than twenty pints (a small pailful) were obtained from the largest ox, and this thick and albuminous; the hands, when plunged into it, came out free of stain. The poison would seem to grow in the blood, and, through the blood to affect the vital organs.

"'A curious feature in the case is, that dogs, reared on milk, die if bitten; while calves, and other young sucking animals, are safe as long as they suck. But a dog, reared on the meat of game, may be hunted in tzetze districts in safety! Man, and all the wild animals, escape with impunity. Can the poison be alkaline, and neutralised by the acid?'"—In what way? The venom of cobras, wasps, &c. reddens litmus-paper.

Proceedings of Societies.

Entomological Society.

July 5, 1858.—Dr. Gray, President, in the chair.

Donations.

The following donations were announced, and thanks ordered to be presented to to the donors: —'Proceedings of the Royal Society,' Vol. ix., No. 31; presented by the Society. 'The Zoologist' for July; by the Editor. 'Exotic Butterflies,' Part 27; by W. W. Saunders, Esq. 'Bulletins de l'Academie Royale des Sciences, des Lettres et des Beaux Arts de Belgique,' 2me Série, Tomes i., ii. et iii.; 'Mémoires Couronnés, Tome vii.; by the Academy. 'The Classed Catalogue of the Educational Division of the South Kensington Museum'; by the Committee. 'The Literary Gazette' for June; by the Editor. 'The Athenæum' for June; by the Editor. 'The Journal of the Society of Arts'; by the Society. 'A Manual of British Butterflies and Moths,' No. 18; 'The Entomologist's Weekly Intelligencer,' Nos. 89, 90, 91 and 92; by H. T. Stainton, Esq.

Exhibitions.

Mr. Smith exhibited some insects of various orders collected at Sierra Leone by Mr. Foxcroft, upon which Mr. Adam White communicated the following notes:—

Anthocharis Evippe, male and female.

Philognoma Varanes. Found in West Africa as well as South Africa.

Romaleosoma Ceres. A genus of many species, of sombre and yet not unhandsome butterflies, peculiar to West Africa.

The large black Hesperia (*Mars. ?*) and two or three other interesting species may be specified.

Pontia Narica. Connecting Pontia with Leucophasia.

Myrina Alcides or an allied species. It would be very valuable to ascertain the transformations of this fine butterfly and of the allied genus Iolaus.

Acræa Circeis, Westw. There are several species of Acræa in this little collection; Acræa Euryta, *var.*, with its spined chrysalis, and Acræa Quirina, a lovely species.

The sugar-cane Nonagria, very like the one figured by Landsdown Guilding, from the West Indies.

Of Sphingidæ, Daphnis Nerii, so widely distributed, and Acherontia Atropos, whose food-plants are also widely spread, may be specified.

The fig-tree feeder is one of the most interesting moths in the collection; it belongs to the same group as Cossus and Zeuzera, and may prove a genus allied to Langsdorfia from Brazil and Cossodes from King George's Sound.

Massaga Hesparia, Walker, Cat. Lep. Het. in Brit. Mus., pt. 2, p. 358. (*Phalæna Hesparia*, Cram. Pap. Exot. i. p. 87, pl. 56, f. C).

We have an imperfect specimen of this in the British Museum from Sierra Leone, where it was found by the Rev. D. F. Morgan. Cramer published it as from Demerara, but Morgan's, and again Foxcroft's capture of it as well as its affinities, show that Sierra Leone is its real habitat.

Thyridopteryx Sierricola, White. *Male*. Antennis subfuscis pallidulis, alis hyalinis, argenteo-nitidis, anticis ad basin plagâ atrâ longi-squamulatâ, thorace lanâ albâ sericeâ longâ induto. *Hab.*—Sierra Leone.

An interesting member of a genus which doubtless abounds in species. Mr. Westwood's monographs of these "Arcana" will require shortly a new edition. This should be figured with its chrysalis, cocoon, &c.

Of Orthoptera, there may be specified a curious Hymenotes with its Membracis-like aspect, a very interesting Mantidous insect allied to one described by Westwood.

Of Coleoptera there are several species, some of which are Myrmecophilous and Staphylinidous.

Of Geodephaga, an Acanthogenius, and a Cicindela, allied to nitidula.

Of Lamellicorns (and the Cetoniadous family in particular) may be specified Plæsiorhina recurva (*Fabr.*), *Schaum.;* Pachnoda fimbriata (*Gory & Perch*), *Burm.*—perhaps only a variety of P. olivacea; Pachnoda marginella.

Of Longicorns, the Mallodon and Hammaticherus, with their transformations, are interesting.

Of Neuroptera, the male Termes is worthy of notice.

And lastly, of the Spiders; there is the large Nephila, belonging to the same group as our garden Epeira Diadema, and which makes very thick silken ropes, which the late Mr. Whitfield once told Mr. White were so strong, that in the forest the wanderer must take care of his face, as he might, if careless, be hurt by coming against them.

Mr. Smith also exhibited some interesting nests of Hymenoptera sent by Mr. Foxcroft from Sierra Leone, amongst which was that of a species of Vespa, formed of a perfectly white material; and a leaf from the same locality covered with small purse-shaped galls, from which a minute black species of Thrips had been bred.

Mr. Westwood observed that although the species of Thrips were certainly insectivorous, yet that certain species were well known as being amongst the greatest pests to the horticulturist, puncturing the leaves of melon, cucumber and other greenhouse plants; the discovery that any species of this group formed galls was certainly quite a new fact, although from the great analogy with the Aphides, it was not improbable that they might be gallicolous, in the same way as certain Aphidæ forming the genus Byrsocrypta.

Mr. Walker also suggested that it was not improbable that the small finger-like galls found so constantly on lime-tree leaves, and of which he had never observed the inhabitants, were also the production of Thrips.

Mr. Westwood, in reference to the exhibition by Mr. Janson, at the preceding Meeting, of a minute species of Heteropterous Hemiptera found in ants'- nests, now exhibited the type specimen of his Microphysa pselaphiformis, together with a specimen of Microphysa myrmecobia of Germar, which last was identical with Mr. Janson's insect, although it was certainly not congenerical with the British type of the genus, which had abbreviated elytra, whereas they entirely cover the abdomen in M. myrmecobia, although destitute of an apical membrane.

Mr. Stevens exhibited a small box of insects sent home by Mr. Shield from Bahia.

Mr. Stainton exhibited some leaves mined by the larvæ of Nepticulæ also sent from Bahia by Mr. Shield, and being the first tropical examples ever brought to this country.

Mr. Stainton also exhibited specimens of Anthrocera Minos found on the west coast of Scotland; and the larvæ of Cemiostoma lotella, mining the leaves of Lotus major, in which they had been found in some plenty by Mr. T. Wilkinson.

Mr. Westwood would take this opportunity of correcting the erroneous view which Mr. Stainton had taken of the remarks made by him on specific differences, at the last

Meeting, asserting in the report of the Meeting published in 'The Entomologist's Weekly Intelligencer,' p. 95, that they went fully the length of maintaining the development theory,—that is, the theory advocated by the Lamarckian and 'Vestiges of Creation' schools, that an animal in a series of ages is able to develope itself into a totally different kind of creature; that a mouse, for instance, anxious to fly, is able after a long series of generations to acquire wings like a bat. Mr. Westwood, on the contrary, affirmed the identity and permanence of species, but insisted not only on the possibility of the modification of individuals composing the species, but also on the permanence of such modifications of specific forms through several or even many generations, so long, in fact, as the disturbing influences which produced the modification remained at work. It was by this kind of radiation from a central specific type that geographical varieties were produced and perpetuated; and thus, for instance, Mr. Westwood was induced to regard all the species of Ornithoptera allied to O. Priamus, recently proposed by himself and others, as modified sub-species or local varieties of that insect. So also were produced by the agency of man himself the different varieties of the silk-worm, so well known in the "magnaueries" of the South of France and Italy. He believed that if many of the Micro-Lepidoptera regarded by Mr. Stainton as distinct species were really such, they would exhibit tangible structural modifications in the length and form of the joints of the palpi, the number of joints in the antennæ, the structure of the veins of the wings, or of the tarsi. Mr. Stainton had, however, failed in describing any such characteristic modifications.

Mr. Stainton observed that he should consider that such differences as Mr. Westwood alluded to would be *generic*, not *specific*.

Dr. Gray maintained the existence of permanent and geographical varieties in all classes of animals, from Mammalia downwards.

Mr. Stevens exhibited a few insects collected in Madagascar by Madame Pfeiffer, amongst which was a fine species of Calandra.

Mr. Mitford exhibited a beautiful Noctüa (*Brana calopasa*) from Ceylon, and gave the following interesting account of the habits of the species, communicated by E. L. Mitford, Esq.:—" One morning in March, about seven o'clock, I saw a cloud of these moths whirling and sporting round the trunk of a large tree. After continuing their gyrations for half an hour, they gradually settled in a large patch on the shady side of the tree, forming a sort of thatch, the wings of one row overlapping the bodies of the next, when they appeared like an excrescence on the bark, which they resembled in colour: this habit is very peculiar to this moth, as it is very uncommon for moths to go in swarms."

Cells of the Honey Bee.

Mr. Tegetmeier stated that he had recently made some experiments with a view of ascertaining whether the cells of the hive-bee were formed hexagonally, or whether such form was the result of lateral pressure, or rather the natural result of placing cells close together without any loss of space; with this object in view he had placed pieces of wax on the bars of one of "Wildman's" hives and watched the bees commence excavating therein; the cells formed, invariably proved cylindrical. They were, however, not in juxtaposition, as in the normal comb.

Mr. Tegetmeier also expressed his conviction that the cells of bees were also formed in the first instance with a hemispherical base, having observed the deposition of the foundations of numbers of cells on the under side of one of the bars of his leaf-hive, which he had removed shortly after the swarm had been hived into it; and also that the outer portion of each cell was also cylindrical until a fresh cell was added on its outer side, when the cell became an inner one, and its outer sides transformed into an hexagon.

Dr. Gray contended that the hexagonal form was undoubtedly the result of lateral pressure, if cylinders composed of any yielding substance (vermicelli for example) were placed side by side and subjected to such pressure, they were invariably forced into the hexagonal form; he considered the attempt made by Natural Theologians to prove that the formation of an hexagonal rather than a cylindrical cell indicated the possession of a greater degree of Divine wisdom bestowed on the insect, was the greatest piece of humbug they had ever brought forward.

Mr. Smith had tried the experiment with cylinders formed of paper pasted together, but failed in producing the result stated by Dr. Gray; he was not prepared to argue or to express any opinion upon the formation of the cells of the hive-bee, but he was prepared to show that the common wasp (*Vespa vulgaris*) constructed her hexagonal cells upon as predetermined a plan as a mason would build a stack of hexagonal chimnies. When the wasp commences the construction of her nest, having found or formed a suitable cavity, she begins by making three circular saucer-shaped receptacles, in each of which she deposits an egg; she then proceeds to form other similar shaped receptacles, until the eggs first deposited are hatched and the young grubs require a share of her attention From the circular bases she now begins to raise her hexagonal cells — not building them up at once, but from time to time raising them as the young grubs grow: this is all effected by the mother-wasp, unassisted by a single worker; and it must be borne in mind, that she works with no plastic material like wax, and that the hexagonal cells are built, course by course, like layers of brickwork. There was fortunately in a box upon the table a specimen of a small nest of a Brazilian wasp, (*Polybia*): these wasps construct in the first place a comb of hexagonal cells, having, like that of the common wasp, circular bases; over the first comb they construct a flat covering or roof, and by this time the grubs are all full-fed and the cells closed in; the wasps now commence a second comb, and the flat roof serves as the foundation to build upon: they form no cup-shaped bases, but build up the walls of the hexagons as regularly as a mason would erect hexagonal chimneys; in some instances, as might be seen in the nest before the Meeting, only the foundation of the first plane of the hexagon is laid down, in another case two, in another three, and so on; but that wasps ever build cylinders, which afterwards become hexagons, in Mr. Smith's opinion, has no foundation in fact.

Mr. Tegetmeier added that he did not consider his experiments as conclusive evidence on the subject; he intended to repeat them and to ascertain, if possible, what use was made of the wax taken from the excavations formed in the pieces of wax which he provided to the bees, and, with that object in view, proposed to colour the wax with Alkanet root before placing it on the bars of the hive.

Mr. Tegetmeier exhibited to the Meeting a new observatory hive which he had lately constructed, having the sides each composed of three plates of glass placed about a quarter of an inch apart, and each made perfectly air-tight at the junction with the frame; by this contrivance he considered a nearly uniform temperature would be maintained in the hive despite external atmospheric changes.

Part 8 of the current volume of the Society's 'Transactions' was on the table. —*E. S.*

NORTHERN ENTOMOLOGICAL SOCIETY.

June 26, 1858.—B. COOKE, Esq., President, in the chair.

Exhibitions.

The Secretary exhibited a box of Lepidoptera kindly furnished by Mr. Machin, of London; in the box there were bred specimens of Retinia Turionana and a short series of Eupithecia pusillata, which Mr. Machin has recently discovered near West Wickham, not at the New Forest, as was represented last year.

Mr. Constantine sent a box of Coleoptera, a present to the Society; in it were Stomis pumicatus, Bembidium monticolum, &c.—all interesting species.

Mr. Pugh exhibited an hermaphrodite Polyommatus Alexis, taken by himself on the coast; the male character being on the left side of the body; the female side is remarkably well-developed, the red spots being very large upon both wings.

Mr. Hodgkinson exhibited a supposed new Cemiostoma from Genista tinctoria.

The President exhibited a box in which were representatives of all orders except Orthoptera; the contents were the result of one day at Rivington, and gave abundant evidence of the richness of the district and the perseverance of the collector: amongst them were some very rare Diptera and a beautiful unrecognised Stegoptera.

A Member exhibited a box of recent captures, from which the Meeting at once learned what were on the wing at New Brighton.

Mr. Cooke then exhibited a number of small Cynips and parasites, bred from oak-galls, and beautifully set on cards; the setting was much admired.

Mr. Gregson exhibited a box of minute Coleoptera collected near Witherslack, in Westmoreland, and a box of Bembidia, collected near Preston and in North Wales; also a box of Eupitheciæ containing bred specimens of E. assimilata, E. absynthiata? *Doubl.*, E. ——— ? n. s., bred from larvæ taken in company with E. castigata larvæ on Lychnis dioica, but differing from that larva in having the marks on the back lozenge-shaped, observing that he has seen this species in cabinets among castigata, but could never reconcile it with that soft woolly-looking species; the specimen before the Meeting being a well-marked insect, the markings fine, but hard; also specimens of E. satyrata bred from heath, and several other species of Eupithecia, including a fine series of E. constrictata and E. succenturiata; also a box in which were specimens of a supposed new Eudorea taken on Engleborough Hill, near Engleton, a few weeks ago, about five hundred yards from the top (it is a dull-coloured fine species), and a fine series of Peronea potentillana bred from strawberry leaves early in June; also a plume which he cannot reconcile with any species in our present list: he also exhibited a lot of cases of a Coleophora upon small sallow (*Salix fusca*); it seems to prefer the variety which grows among the grass to the variety which forms clumps, though he had found a few larvæ on the larger variety; it belongs to the Anatipennella group, but wants the neck which is so conspicuous in all the known species in this group, in other words it is a pistol-shaped case without the barrel; it is not scarce: he also exhibited Carabus nitens, taken by baiting; the plan adopted being to place a piece of ham-sandwich under a bunch of loose heath in the centre of a wettish swamp patch on the "moss;" these patches are perfectly bare, hence the beetles cannot get under cover when you go for them; the first bait placed at night produced three fine specimens of nitens next morning, — one munching ham, one eating bread and butter, the other asleep.

The Rev. H. H. Higgins also brought a box of Carabus nitens for distribution, and informed the Meeting he was now engaged upon a new Flora of the district around Liverpool, and asked the opinion of the Meeting as to the desirability of attaching the names of Lepidopterous larvæ to the plants on which they feed; the Meeting considered it desirable if a plan could be struck out, and requested the Secretary to take the responsibility as to the accuracy of the information tendered.

Mr. N. Cooke announced the discovery of the centre of Bankia Bankiana by one of the members, Mr. Birchall, and observed that thus another of the lost species would be made common; a discussion took place as to what species were yet to be rediscovered, in which strong language was used towards gentlemen who kept their localities a secret: it was observed, Weaver, as a dealer, had a perfect right to retain his information, yet entomologists generally had obtained more information from him than from some who are not called dealers.

The Secretary read an extract from a letter from Dr. Battersby, of Torquay, offering Acontia luctuosa to those members who wanted it, and informing the Meeting that he had captured Micra ostrina (!); also a letter from W. Hydes, who is now collecting at the New Forest for the members of the East Lancashire Entomological Society, from which it appeared he had been very successful until some London dealer had got him driven from the New Park, by telling the keepers he was injuring the young oaks.

Mr. Morrot exhibited some admirably got-up anatomical parts of insects under the microscope; they reflected great credit upon the manipulator, and gave great pleasure to the members present.

The President, on behalf of E. Newman, Esq., read the following paper:—

On Diminutive Cocoons of Cossus ligniperda.

"Trifling deviations from the ordinary mode of pursuing the path of life are much more interesting in insects than in ourselves: insects follow the leader as a matter of course; *we* only do so when it answers our purpose: insects are proud of following the leader; we do so by stealth, and often with confusion of face, and don't like to be caught out: insects are much more consistent in their general conduct than we are. It is on this very ground that when an insect deviates from its ordinary course we like to know the why and the wherefore, in fact we want to be told all about it. Now, there are every now and then to be met with small cocoons of Cossus, indeed so small that entomologists in general won't believe them Cossus at all, and suppose them to be some undiscovered species of Sesia, a trifle less perhaps than Apiformis and Bembeciformis, and a trifle bigger than Tipuliformis and the minors: under this idea the little cocoons are cherished, but perversely refuse to produce moths, being always infested by an Ichneumon, the familiar red-legged Lampronota setosa. This fact still adds to their value and to the mystery; for every one wants to know what undiscovered clearwing always turns to a red-legged Ichneumon? These cocoons always occur in the usual mines of Cossus, sometimes in oak, commonly in willow, always very near the outer bark, always compact, tough, plentifully provided with silk, abundantly intermixed with the carpenter's chips; the Cossus grub was never more aptly described than when he was called Xyleutes or the carpenter. Only one entomologist to whom I have shown these cocoons was aware of their true nature, and that entomologist was Mr. Bond, a gentleman second only to Mr. Doubleday himself in his knowledge of the preparatory states of British Lepidoptera.

"Let us return to the cocoons. I have said they invariably produce Ichneumons which are always of one species. Does it then follow that when the larva of Cossus is stung by an Ichneumon, it invariably becomes dwarfed, and, dwindling to the dimensions of a moderate-sized Sesia, terminates its existence in this aborted form? Certainly not as a rule; on the contrary, the largest cocoons frequently produce Ichneumons, giving no indication of the contained parasite until he vibrates his iridescent wings on the exterior of his prison-house. The mystery admits of another solution. The larva of Cossus is of slow growth and of long life; some say it lives four years, some three, some two. Mr. Standish tells me he kept some larvæ after they seemed full-grown between three and four years; and that they pertinaciously and obstinately refused to chryssle at all until at last he threw them away, utterly disgusted with their seemingly unnatural conduct. Now, these insect Methuselahs are infested by a parasite which never enjoys the pleasure of seeing them face to face, but obtains access to them by thrusting her long ovipositor into their galleries, having first ascertained, by antennal investigation, that the gallery is tenanted; but not being in the least particular about the age or sex of her victim. Thus aiming at random, the egg may be deposited in the sleek body of a four-year-old, in the slimmer proportions of a three-year-old, or perhaps in the interior of a mere colt, a juvenile that has not yet kept his first birth-day. Now, although the longevity of the Cossus larva is well established, we have no evidence of the longevity of the Ichneumon larva; on the contrary, all the ascertained facts of its history go to prove that its period of existence is uniformly limited to a year; the egg of one year producing a fly the next. Hence, feeding away with the normal voracity of its tribe, the Ichneumon larva exhausts the Cossus larva in a few months, whether it be a one-year, or a four-year-old, always, however, allowing it life enough to form its ordinary cocoon, an operation with which no ichnemonizing seems to interfere; and hence also we have cocoons of varied sizes proportioned to the age of the Cossus, but quite independent of that of the Ichneumon. I think, therefore, that no doubt need now be entertained on the subject of these familiar little cocoons: and I hope speculative opinions as to their being 'something good' will cease; for of a certainty they are the progeny of veritable 'goats,' and possess the genuine fragrance of their sires, although their existence is terminated by the ungrateful guest they have nurtured while they are yet mere 'kids.'—Edward Newman."

The Secretary observed, in confirmation of Mr. Newman's remarks, he had repeatedly had diminutive cocoons of Cossus ligniperda sent to him for his opinion as to what new species they would produce, and remarked this paper settled a long-standing disputed question.

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TO CORRESPONDENTS.

Our readers will perceive that the present number is composed simply of the overflowings of the last; the only additional matter being the Report of the Entomological Society's Meeting. The accumulation of contributions has not been material during the current month, and I hope to dispose of all arrears in the September number. One more double number will probably be required before the close of the year, but as so large a proportion of my Subscribers are now prepaying they will consider this rather a boon than otherwise.—Edward Newman.

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